

I claim:

1. A method for the preparation of H_2O_2 wherein,

H_2O_2 is produced by a first reaction, electrolysis converting H_2SO_4 into H_2 and $\text{H}_2\text{S}_2\text{O}_8$ and then a second reaction, said $\text{H}_2\text{S}_2\text{O}_8$ formed in first reaction, is reacted with H_2O in a second reaction to form H_2O_2 and H_2SO_4 and wherein,

at least one of: the separation of said H_2 from said $\text{H}_2\text{S}_2\text{O}_8$, the separation of said H_2 from a mixture of said $\text{H}_2\text{S}_2\text{O}_8$ and said H_2SO_4 , the separation of said H_2O_2 from said H_2SO_4 , the separation of said H_2O_2 from said $\text{H}_2\text{S}_2\text{O}_8$, the separation of said H_2O_2 and water from said H_2SO_4 , the separation of said H_2O_2 from a mixture of said H_2SO_4 and said $\text{H}_2\text{S}_2\text{O}_8$, the separation of said H_2SO_4 from said $\text{H}_2\text{S}_2\text{O}_8$ and any combination therein is performed with a membrane.

2. The method of claim 1, wherein the first reaction does not go to completion and wherein,

a mixture of H_2SO_4 and $\text{H}_2\text{S}_2\text{O}_8$ is reacted with H_2O in the second reaction.

3. The method of claim 1, wherein said membrane is constructed of organic materials.

4. The method of claim 1, wherein said membrane is constructed of inorganic materials.

5. The method of claim 1, wherein said H_2SO_4 in the second reaction is recycled to the first reaction.

6. The method of claim 1, wherein said electrolysis is performed across an electrically charged conductive membrane.

7. The method of claim 1, wherein said electrolysis is performed with electrodes.

8. The method of claim 7, wherein said electrodes are made of at least one of:
zirconium, hastelloy, ceramic and titanium.

9. The method of claim 1, wherein at least one of the separation processes is
performed with distillation.

5 10. The method of claim 9, wherein said distillation separates H_2 from at least one of
 H_2SO_4 and $H_2S_2O_8$.

11. The method of claim 9, wherein said distillation separates H_2O_2 from at least one
of H_2SO_4 and $H_2S_2O_8$.

10 12. The method of claim 9, wherein said distillation separates H_2O from at least one
of H_2SO_4 and $H_2S_2O_8$.

13. The method of claim 1, wherein said second reaction contains an excess of said
 H_2O , wherein an aqueous concentration of said H_2O_2 is generated.

14. The method of claim 1, wherein H_2O is added to said H_2O_2 from said second
reaction.

15 15. The method of claim 1, wherein there is no vehicular transportation of said H_2O_2 .

16. The method of claim 1, wherein said H_2 produced in the first reaction is utilized in
a fuel cell to generate electricity.

17. The method of claim 16, wherein at least a portion of said electricity is used for
the electrolytic conversion of H_2SO_4 into H_2 and $H_2S_2O_8$.

20 18. A process of H_2O_2 production wherein,

 H_2O_2 is produced by a first reaction, electrolysis converting H_2SO_4 into H_2 and
 $H_2S_2O_8$ and then a second reaction, said $H_2S_2O_8$ formed in first reaction, is reacted with H_2O in a
second reaction to form H_2O_2 and H_2SO_4 and wherein,

at least one of: the separation of said H_2 from said $H_2S_2O_8$, the separation of said H_2 from a mixture of said $H_2S_2O_8$ and said H_2SO_4 , the separation of said H_2O_2 from said H_2SO_4 , the separation of said H_2O_2 from said $H_2S_2O_8$, the separation of said H_2O_2 and water from said H_2SO_4 , the separation of said H_2O_2 from a mixture of said H_2SO_4 and said $H_2S_2O_8$, the separation of said H_2SO_4 from said $H_2S_2O_8$ and any combination therein is performed with a membrane.

19. The process of claim 18, wherein the first reaction does not go to completion and wherein,

a mixture of H_2SO_4 and $H_2S_2O_8$ is reacted with H_2O in the second reaction.

20. The process of claim 18, wherein said membrane is constructed of organic materials.

21. The process of claim 18, wherein said membrane is constructed of inorganic materials.

22. The process of claim 18, wherein said H_2SO_4 in the second reaction is recycled to the first reaction.

23. The process of claim 18, wherein said electrolysis is performed across an electrically charged conductive membrane.

24. The process of claim 18, wherein said electrolysis is performed with electrodes.

25. The process of claim 24, wherein said electrodes are made of at least one of: zirconium, hastelloy, ceramic and titanium.

26. The process of claim 18, wherein at least one of the separation processes is performed with distillation.

27. The process of claim 26, wherein said distillation separates H_2 from at least one of H_2SO_4 and $H_2S_2O_8$.

28. The process of claim 26, wherein said distillation separates H_2O_2 from at least one of H_2SO_4 and $H_2S_2O_8$.

5 29. The process of claim 26, wherein said distillation separates H_2O from at least one of H_2SO_4 and $H_2S_2O_8$.

30. The method of claim 18, wherein said second reaction contains an excess of said H_2O , wherein an aqueous concentration of said H_2O_2 is generated.

31. The process of claim 18, wherein H_2O is added to said H_2O_2 from said second
10 reaction.

32. The process of claim 18, wherein there is no vehicular transportation of said H_2O_2 .

33. The process of claim 18, wherein said H_2 produced in the first reaction is utilized in a fuel cell to generate electricity.

15 34. The process of claim 33, wherein at least a portion of said electricity is used for the electrolytic conversion of H_2SO_4 into H_2 and $H_2S_2O_8$.